

ABSTRACT OF THE DISCLOSURE

A field-effect transistor used as a sensor for measuring a gas or ion concentration utilizes a surface structure such as rings along with surface profiling, for example elevations of the rings and depressions therebetween, to decrease the surface conductivity between a guard ring and the FET, to thereby increase the concentration rise per unit time of a gas signal and increase the time for a potential on a channel region of the FET to approximate the potential on a guard ring. The rings, which may be arranged around the FET structure, may be defined by a surface material different from the remaining surface material and thus having different surface conductivities. The surface profiling, together with the rings, can be utilized to increase the RC time that may describe the equalization of the channel region potential to the guard ring potential. The elevations may have a surface conductivity different from, for example smaller than, that of the depressions. The surface profiling may be formed by forming the elevations on a thick oxide layer and spaced a distance apart. The annular structures arranged on the thick oxide layer and defined by a surface material different from the remaining surface material may have different surface conductivities and thus may form different, for example higher, contact resistances.